

Application No.: 10/521,818

REMARKS

By this amendment, claims 1 and 4 are revised to place this application in condition for allowance. Currently, claims 1, 3, and 4 are before the Examiner for consideration on their merits. Applicants request reconsideration of the final rejection.

In review, the Examiner newly-cites United States Patent No. 6,699,302 to Jones et al. (Jones) to allege that the limitations regarding the size of the copper source material and the control of the slag discharge based on copper content are known such that the modifications of the method of Ezawa and Yamada are obvious.

Applicants submit that the prior art cited by the Examiner does not establish a *prima facie* case of obviousness against any of claims 1, 3, and 4. The traverse of the rejections is outlined below under the headings of the issues related to the rejection.

The step of discharging the molten slag based on ascertaining the copper content of the slag is not suggested by Jones.

In the final rejection, the Examiner contends that both JP '322 and Jones teach that "the copper content of the molten slag is a result effective variable in term of platinum group metal recovery rate".

Applicants again reiterate the previous argument that JP '322 does not teach the steps of ascertaining and discharging as now found in claim 1. The

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Examiner continues to alleges copper in the molten slag is taught to be a result effective variable in JP '322. This is pure speculation on the Examiner's part. What the Examiner is doing is observing that just because JP '322 discloses copper and platinum contents in Tables 1 and 2, this leads to the conclusion that the ascertaining steps and discharging steps are obvious. There is absolutely no basis to make this leap based on the mere fact that JP '322 reports on the levels of copper and platinum. If the Examiner believed that JP '322 was sufficient to support the rejection, the Examiner would have maintained the previous rejection and not seen the need to further cites the Jones patent to buttress the conclusion that the ascertaining and discharging steps are obvious. Thus, it is Applicants' view that the Examiner must rely on Jones in establishing a *prima facie* case of obviousness in this instance and the failings in Jones in this regard taint the rejection.

Regarding Jones, this patent also does not teach the ascertaining and discharging steps as alleged by the Examiner. Jones relates to a process of treating a metal sulfide concentrate by the steps of roasting the concentrate to reduce the sulfide content of the concentrate. This is followed by a smelting of the roasted concentrate under reducing conditions in an electrically stabilized open-arc furnace, see col. 4, lines 26-36.

The Examiner asserts that Jones teaches a similar PGM recovery process using a similar electric furnace. This is not so when considering the details of the process of Jones. In the smelting operation of Jones, the charge of

roasted concentrate is added together with calcine and approximately 5% coke addition at an average temperature of 1650 °C, see col. 18, lines 20-22. Although the roasted concentrate is associated with PGMs, these materials are not the same as the platinum group materials of claim 1, as amended.

The composition of the roasted concentrate of Jones is exemplified in the Table on lines 35-45 of col. 18 as follows:

Al ₂ O ₃	5.4%
C	0.09%
CaO	4.3%
Co	0.06%
Cr ₂ O ₃	1.01%
Cu	1.01%
FeO	16.3%
MgO	19.9%
S	0.25%
SiO ₂	43.3%
PGMs	296 g/t

From this it can be seen that Cu exists in an amount of only 1%, which is extremely lower than the other ingredients of the roasted concentrate. What Jones does is then roast this concentrate to recover the PGM. The Examiner purports to say that Cu is an element of interest or a result effective variable in terms of the recovery of PGM in Jones. This stance is refuted by the composition of the concentrate, which reveals that Cu is insignificant from Jones perspective and it cannot be concluded that its mere presence means that it is some result effective variable for control of the recovery of PGMs.

The alloy produced by the smelting step of Jones is found in the Table at the top line of col. 19. This alloy makeup is as follows:

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C	1.06 or 0.97%
Co	0.33 or 0.50%
Cr	3.35 or 2.35%
Cu	7.56 or 7.43%
Fe	67.7 or 71.7%
Ni	16.6 or 15.3%
S	0.48 or 0.97%
Si	1.34 or 1.05%
PGMs	0.17 or 0.26%

The alloy recovering PGMs of Jones contains high levels of Fe, Ni, and Cr in addition to around 7% of Cu. During the operation of the furnace of Jones, which forms the 70Fe-15Ni-3Cr alloy with included PGMs, many kinds of oxides that will be forming slags are reduced to their metallic state to form the thus-produced alloy. For example, almost all of the FeO is reduced to Fe metal and a partial reduction of Cr₂O₃ and SiO₂ and the likes into their respective metals occurs. However, the reduction of copper oxide is the slag is negligible in comparison to the reduction of FeO. Further, a close inspection of the Table on lines 35-45 of col. 18 reveals no description of copper oxide in the roasted concentrate and the slag obtained. This Table merely describes elemental copper in an amount of 1.01% in the roasted concentrate and 0.13% expressed as elemental copper in the slag. Therefore, copper oxide cannot be an element which is monitored for recovery of PGM content of the slag.

In the rejection, the Examiner cites Jones to support the conclusion that it would be obvious to "apply a slag analysis and monitoring process of US '302 in the process of US '305 because US '302 teaches high recovery of

precious metals could be obtained. This conclusion is a distortion of the teaching of Jones and is factually incorrect. As explained above, Jones does not teach the analyzing the copper content of the molten slag in the furnace and using this information to control the discharge of the molten slag from the electric furnace. The mere fact that Jones may conduct analyses of the concentrate and slag does not equate to the claimed processing steps. The Examiner has leapt to the conclusion of obviousness without the requisite factual support in Jones and this leap taints the rejection and requires its withdrawal.

Claim 1, in its amended form, clearly defines a series of steps, which cannot be gleaned from Jones analyses of the original concentrate, roasted concentrate, or slag. Jones says absolutely nothing about monitoring the copper content of the molten slag in connection with a step of discharging the molten slag from the furnace as is required by claim 1.

As previously argued, the invention is the discovery that the recovery of PGMs from a substance including spent petrochemical type catalyst or spent vehicle exhaust gas purification catalyst can be significantly improved by reducing copper oxide in the slag of the electric furnace. Jones does not teach a relationship between PGMs and copper content in the slag, whereas the inventors have discovered this relationship as evidenced by Figure 2 of this application. Again, it is error for the Examiner to conclude that the ascertaining and discharging steps of claim 1 are obvious based on the mere

analysis of the composition of the original concentrate, roasted concentrate and slag of Jones.

Based on the above, the Examiner has failed to establish a *prima facie* case of obviousness against claim 1 by reason that the facts relied upon in terms of the teachings of Jones do not support the conclusion of obviousness.

Jones does not teach that the diameter of the source material is a result effective variable.

In the rejection, the Examiner contends that Jones supports the position that the control of the source material size is obvious since the size is a result effective variable. This conclusion using Jones to support it is also in error. Jones discloses that the DC arc furnace can handle fine feed materials, typically sized below 3mm, which makes it well suited for coupling to a fluidized-bed roaster. However, there is no teaching in Jones that the solid state of PGMs in the slag come to transfer into molten copper drops flows formed by the reduction of copper oxide in the slag when the copper oxide to be charged in the furnace is composed of granules of an average grain diameter of not less than 0.11 mm and not greater than 10 mm. The roasted concentrate of Jones is not comparable to the copper source material including copper oxide for recovering PGMs. Therefore, the conclusion that Jones teaches the claimed step of control of copper source material as stated in claim 1 is speculation on the part of the Examiner. The Examiner has

simplified the claim to the mere control of the feed to the furnace so that Jones can be used to allege that controlling the feed size is a result effective variable. Claim 1 is more specific than this, calling for control of the charge of the copper source material that is added in addition to a platinum group element containing substance as now defined. The control of the charge of the copper source is not found in Jones since Jones teaches an entirely different process than the one claimed, i.e., the charging, sinking, and enriching steps of claim 1. Jones also fails to teach anything about the recovery of the type of platinum bearing materials now recited in the claims, i.e., exhaust gas catalysts and petrochemical type catalysts. Jones merely smelts a roasted concentrate, which the Examiner contends is the platinum source material. There is no charge of a copper source with the source of PGMs in Jones. Consequently, it is error for the Examiner to contend that Jones supports the contention that control of the charge of the copper source material is a recognized result effective variable.

Jones does not teach the limitations of Claim 4

In the rejection, the Examiner cites Jones to buttress the rejection of claim 4. Claim 4 requires the step of separating the molten metal enriched with the PGMs from the molten slag and transferring the molten metal to a separate furnace and oxidizing the separated molten metal to form another

slag and a molten metal layer further enriched with the platinum group elements.

Jones refines the alloy formed by smelting by blowing the molten alloy with air. With this air blowing, carbon in the alloy is decreased from about 1% to about 0.04% together with decreasing Si from 1-1.3% to less than 0.05% and with a slight decreasing of Fe and Cr, but Cu and Ni in the alloy increase instead of decrease. Notably, PGMs do not change. Also, copper does not change to copper oxide in the air blowing and PGMs are not enriched. Thus, it cannot be said that this step is the same as the oxidizing step of claim 4.

In the rejection, the Examiner contends that the water cooling step in the separate furnace is taught in col. 6, lines 18-33 and claim 19. Claim 19 refers to a treatment of the thus formed alloy, not the slag formed by the oxidizing step and it is not understood how this supports the contention that the water cooling step is found in Jones. The col. 6 disclosure of Jones merely talks about the feed size to the furnace and this is unrelated to the water cooling step of claim 4. Finally, linking claim 19 to the col. 6 disclosure also makes no sense. Claim 19 refers to forming particles of the alloy for further hydrometallurgical treatment, whereas the col. 6 disclosure speaks of the feed to the furnace. The two are unrelated and grouping them to substantiate the rejection is error.

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Claim 4 is patentable for the reasons set forth above for claim 1.

Claim 4 is also patentable by reason that it includes the limitations of claim 1 with respect to the ascertaining and discharging steps.

After Final Response

This submission does not raise any new issues requiring further consideration. The ascertaining and discharging steps were previously argued and the revision to the claims in this regard is made only to clarify these steps. The further clarification of the platinum group element-containing substance also does not raise a new issue since these materials are disclosed in Ezawa.

Summary

To recap, the reliance on Jones to support the rejection is improper. Jones does not teach the ascertaining and discharging steps of claims 1 and 4. Jones also fails to teach that the size of the copper source material is a result effective variable since Jones does not even employ such a source material. Jones also fails to teach the water cooling step of claim 4 since Jones does not even separate the slag and molten metal and further process the molten metal. Therefore, a *prima facie* case of obviousness has not been established with respect to claims 1 and 4 and these claims along with dependent claim 3 are in condition for allowance.

Accordingly, the Examiner is requested to examine this application in light of this Amendment and pass all pending claims onto issuance.

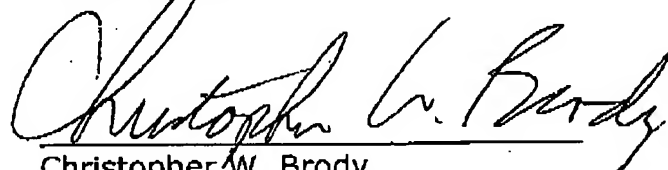
If the Examiner believes that an interview would be helpful in expediting the allowance of this application, the Examiner is requested to telephone the undersigned at 202-835-1753.

The above constitutes a complete response to all issues raised in the Office Action dated June 5, 2008.

Again, reconsideration and allowance of this application is respectfully requested.

Applicants respectfully submit that there is no fee required for this submission, however, please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,
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